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Iohexol in the management Small Bowel Obstruction

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Abstract

Introduction: Despite progress in surgical techniques and perioperative care, small bowel obstruction (SBO) and postoperative ileus (POI) continued to be common consequences of abdominal surgery. These conditions often led to prolonged hospital stays, increased medical expenses, and frustration for both patients and surgeons. The adoption of nonoperative measures, such as the use of oral water-soluble contrast agents, signified a significant advancement in the management of patients experiencing postoperative small bowel obstruction.

Patients and Methods: A study was carried out at the Department of Surgery ESIC Medical College and PGIMSR involving 105 adults. The study centered on individuals presenting with clinical and radiologic indications of small bowel obstruction. Data collection occurred from March 2022 to November 2023, spanning a period of 21 months.

Results: Seventy-eight percent of patients who presented to the emergency department with symptoms of adhesive small bowel obstruction (SBO) initially underwent nonoperative management with iohexol. This approach resulted in reduced hospital stays, a decreased need for surgery, and earlier recovery. Among them, 18% ultimately required surgery.

Conclusion: Sixty-six percent of the patients underwent a successful oral water-soluble contrast (OWSC) challenge. This approach proved to be a valuable strategy for hastening the decision-making process in the management of adhesive small bowel obstruction (SBO). It was associated with a low estimated risk of late small bowel resection for ischemia, reported at approximately 0.2% in the study.

Keywords: Small Bowel Obstruction; Iohexol; Nonoperative Management of SBO; Water-Soluble Contrast Challenge

Background

Intestinal obstruction represented a common cause of emergency general surgery admissions and often presented acutely to the emergency department [1-3]. SBO was also a leading cause of emergency general surgery procedures due to exploration and subsequent small bowel resection or adhesiolysis [4]. Clinical signs and symptoms guided emergent surgery, while imaging like CT, MRI, and ultrasound crucially identified bowel issues, informing rapid intervention decisions for ischemia, necrosis, perforation, or obstructions [5-7]. The water-soluble contrast (WSC) challenge, established since the 1950s, was popular for assessing suspected SBO. A formal protocol involved serial abdominal X-rays post-oral WSC administration to monitor contrast transit into the colon. Successful challenges involved colonic contrast transit, while failed ones lacked colonic contrast [9,10].

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Therapeutic effect: Though the diagnostic utility of the WSC challenge was widely agreed upon, there was uncertainty about its therapeutic benefit. Previous research, including meta-analyses and a prospective trial, suggested that the WSC challenge significantly reduced the need for surgery or hospital stay length [11-13].

Introduction

This study aimed to investigate the reduction in hospital stay length and decreased surgical requirements in patients diagnosed with SBO using iohexol.

Patients and Methods

A case series analytic study was conducted at the Department of Surgery ESIC Medical College and PGIMSR involving 105 adults. The study focused on individuals with clinical and radiologic indications of small bowel obstruction. Data collection spanned from March 2022 to November 2023, covering a period of 21 months. A protocol was designed based on Bologna guidelines for the diagnosis and management of adhesive small bowel obstruction (ASBO)-2013 [14-19]. All routine investigations, including CBC, LFT, RFT, S. electrolytes, S. amylase, S. lipase, S. lactate, erect abdomen X-ray, and chest X-ray, were performed. Electrolyte abnormalities were corrected as needed. A nasogastric tube was inserted for decompression, continuous abdominal girth monitoring was conducted along with input and output monitoring, and the patient was kept NPO (nothing by mouth).

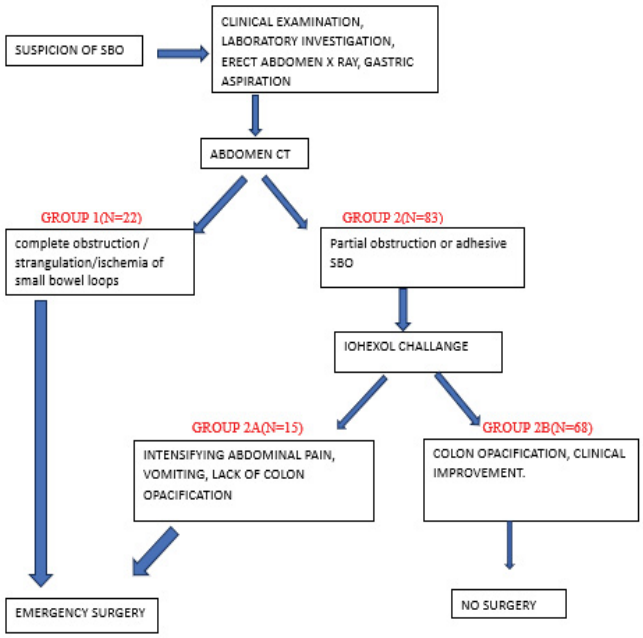
In patients exhibiting abdominal tenderness, peritonitis, hemodynamic instability, significant acute abdominal pain persisting despite gastric decompression, or CT scan indications of small bowel ischemia (group 1), emergency surgery was conducted. The approach, either laparotomy or laparoscopic, was determined based on factors such as intestinal distension, the patient's medical history, and the surgeon's personal experience. Subsequently, a gradual refeeding process was initiated, beginning with a liquid diet.

Results are reported as the median (range) or as the mean SD 1. We used the chi-square test or Student's *t* test, as appropriate. An analysis compared group 2A (patients managed firstly nonoperatively who underwent delayed surgery) with group 2B (patients managed exclusively nonoperatively). The following variables were studied: age, sex, prior abdominal surgery , clinical presentation, blood tests results: serum lactate (mmol/L), white blood cell count (109 cells/L), C-reactive protein level (mg/L). Statistical significance was defined as $p < 0.05$. All analyses were performed with SPSS statistics software version 16.

Inclusion criteria: Patients older than 18 years with clinical and radiologic indications of non-mechanical small bowel obstruction and postoperative paralytic ileus.

Exclusion criteria: Patients with impending small bowel perforation, pregnancy, allergy to iodine, hernia, known non-specific inflammatory bowel disease, symptoms suggestive of strangulating obstruction (fever, tachycardia, continuous pain with peritoneal irritation, metabolic acidosis), obstruction complicating an infective intra-abdominal process such as diverticular disease, known abdominal cancer, and previous treatment with abdominal radiotherapy were excluded from the study.

WSC challenge technique: Gastric decompression for a minimum of 2 hours was essential to ensure effective stomach decompression before contrast administration. Subsequently, undiluted water-soluble contrast (100ml of iohexol - Omnipaque concentration 300mg iodine/mL) was administered at the patient's bedside through the nasogastric (NG) tube. Most protocols involved 40 to 150ml of undiluted contrast. Optionally, 50ml of water could be used to flush the NG tube before clamping for 2 hours. Following contrast administration, abdominal radiographs were taken at specified intervals. The first abdominal X-ray (AXR) was conducted 6 hours post-contrast administration, with a 24-hour AXR endpoint aligning with recommendations in the Bologna guidelines for the management of adhesive small bowel obstruction.



Emergency surgery was undertaken for patients in group 2A, who were characterized by persistent abdominal pain, the onset of abdominal tenderness, or vomiting during the clamping test. Additionally, surgery was considered if the abdominal plain radiograph revealed no contrast product in the colon or rectum. For other cases in group 2B, the nasogastric tube was removed after the 6-hour clamping test.

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Table 1: Comparison of baseline characteristics between patients in group 1 and patients group 2

Parameters	Group 1(N=22)	Group 2(N=83)
Age	66(21-89YRS)	62(20-92YRS)
Gentleman	10(45.4%)	40(48.1%)
H/O Previous abdominal surgery	18(81.81%)	79(95.1%)
H/O Abdominal Tenderness	9(40%)	10(1.92%)
Prior SBO	4(18.18%)	28(33.7%)
S.Lactate	1.7(0.5-8.0)	1.1(0.5-5.0)
WBC	11585	10400
No. of days of hospital stay	7.682	4.554

Table 2: Comparison of baseline characteristics between patients in group 2A and patients group 2B

Parameters	Group 2A(N=15)	Group 2B(N=68)	P Value
Age	61.4 (21-89YRS)	62.4(20-90YRS)	<0.001
Gentleman	8(53%)	40(58.8%)	0.696
H/O Previous abdominal surgery	13(86.6%)	59(86.7%)	0.991
H/O Abdominal Tenderness	1(6.6%)	4(5.8%)	0.908
Prior SBO	3	25	0.213
S.Lactate	1.1(0.5-8.0)	1.2(0.5-5.0)	0.726
WBC	11585	10400	<0.001
No. of days of hospital stay	10.96	3.25	<0.001

Results

A total of 105 patients who came to the emergency room with suspected SBO were treated as per the drafted protocol.

Discussion

Adhesive small bowel obstruction (SBO) was a frequent reason for emergency department visits, often arising post-abdominal surgery. It continued to be a significant clinical concern, both in terms of economic costs and morbidity, with a documented rise in mortality among the elderly population. While the majority of SBO cases could be safely managed with initial nonoperative approaches, the recommended therapeutic strategy remained a subject of controversy [20-23]. An optimal management plan would have prioritized immediate operative exploration when signs were evident at admission. It aimed to promptly identify patients who would not respond to conservative management and also reduce the occurrence of nontherapeutic abdominal explorations by incorporating water-soluble oral contrast tests.

The most recently updated guidelines for small bowel obstruction (SBO) management recommended an initial medical approach for 72 hours before considering surgical intervention, unless signs of severity were evident [24]. Nevertheless, there appeared to be an association between delayed surgery and heightened morbidity and mortality rates. The challenge lay in devising strategies to expedite the identification of patients who were likely to be unresponsive to nonoperative management [25,26].

In our series, 20% of small bowel obstruction (SBO) patients underwent immediate surgery. Various factors predicted the necessity for emergency surgery, including significant and persistent abdominal pain, elevated serum lactate levels, and evidence of small bowel ischemia on CT scan images. Seventy-eight percent of patients presenting to the emergency department with symptoms of adhesive small bowel obstruction (SBO) initially underwent nonoperative management. Among them, 18% ultimately required surgery, a rate comparable to other case series reporting rates ranging from 20 to 40%. In our approach, we opted for a 6-hour waiting period after the administration of iohexol to determine the necessity for surgery. Notably, there was no definitive evidence in the literature specifying the optimal waiting time before surgery in such cases [27].

Patients who were successfully managed nonoperatively experienced a significantly shorter length of hospital stay, with a median of 3 days. This indicated that the use of iohexol hastened the return home for patients who did not require surgery and reduced the time taken for surgical decision-making when conservative management was ineffective. While our study did not provide direct evidence that iohexol had a therapeutic effect, it did establish its utility as a diagnostic tool, aiding in the swift decision-making process for managing patients with small bowel obstruction (SBO).

Few comparative randomized studies had been published on the effect of Gastrografin on adhesive SBO. Assalia et al. observed that water-soluble oral contrast promoted and hastened the resolution of SBO but had no significant effect on the incidence of operation. These authors only studied patients with partial SBO, based on Brolin criteria [28]. Feigin et al. observed that, although water-soluble contrast was safe and useful in the diagnostic process, it did not offer advantages as a supplement to the usual conservative treatment of postoperative SBO [29]. Fevang et al. in a randomized study, observed that the use of a mixture of Gastrografin and barium in patients with adhesive SBO did not resolve the obstruction [30]. In contrast with the authors' experience, a recent randomized trial showed that Gastrografin reduced the need for surgery by 74 percent. However, the significance of these results was questionable because of the randomization criteria used in the study [8].

The study by Biondo et al. [14], a randomized clinical trial on Gastrografin administration in patients with adhesive small bowel obstruction, demonstrated a reduced hospital

stay of 4.1 days compared to an 8.5-day stay in the control group where no water-soluble contrast (WSC) was given. In contrast, our study, utilizing iohexol, showed an even shorter hospital stay of 3.2 days with a significant p-value. This suggested that the use of iohexol may have been associated with a further reduction in hospitalization duration compared to Gastrografin. In literature, there were few studies reporting the use of oral water-soluble contrast in the management of SBO of a virgin abdomen. In the study of Fukami et al. OWSC seemed to be equally effective in the management of SBO both in patients with a virgin abdomen and patients with previous surgery [8]. Collom et al. showed in his study that the use of OWSC significantly reduced the need for operative intervention in patients with a virgin abdomen [9,10].

Our findings demonstrated the feasibility of managing small bowel obstruction (SBO) with iohexol in patients with a virgin abdomen, without increasing the risk of delayed surgery. It was difficult to say that the shorter stay was due to iohexol administration alone, as it may have been due to the SBO being less severe in our study. We needed a study with patients without iohexol and not needing surgery and patients with iohexol and not needing surgery to visualize the effect of iohexol.

Conclusions

The use of Iohexol for managing adhesive small bowel obstruction (SBO) demonstrated a significant reduction in hospital stay duration and a low incidence of requiring small bowel resection due to ischemia. This protocol proved to be simple, cost-effective, feasible, and easily reproducible, suggesting a viable alternative to traditional methods. Further studies may solidify its role in improving patient outcomes and resource utilization.

References

1. Gale SC, Shafi S, Dombrovskiy VY, et al. The public health burden of emergency general surgery in the United States: A 10-year analysis of the Nationwide Inpatient Sample- 2001 to 2010. J Trauma Acute Care Surg 77 (2014): 202-208.
2. Ozturk E, Van Iersel M, Stommel MM, et al. Small bowel obstruction in the elderly: a plea for comprehensive acute geriatric care. World J Emerg Surg 13 (2018): 48.
3. NELA Project Team. Sixth patient report of the National emergency laparotomy audit. RCoA London; 2020.
4. Scott JW, Olufajo OA, Brat GA, et al. Use of national burden to define operative emergency general surgery. JAMA Surg 151 (2016): e160480.
5. Paulson EK, Thompson WM. Review of small-bowel obstruction: the diagnosis and when to worry. Radiology 2015; 275: 332-342.
6. Diamond M, Lee J, LeBedis CA. Small bowel obstruction and ischemia. Radiol Clin North Am 57 (2019): 689-703.
7. Scrima A, Lubner MG, King S, et al. Value of MDCT and clinical and laboratory data for predicting the need for surgicalintervention in suspected small-bowel obstruction. AJR Am J Roentgenol 208 (2017): 785-793.
8. Fukami Y, Kaneoka Y, Maeda A, et al. Clinical effect of water-soluble contrast agents for small bowel obstruction in the virgin abdomen. World J Surg 42 (2018): 88-92.
9. Collom ML, Duane TM, Campbell-Furtick M, et al. East SBO workgroup: Deconstructing dogma: Nonoperative management of small bowel obstruction in the virgin abdomen. J Trauma Acute Care Surg 85 (2018): 33-36.
10. Amara Y, Leppaniemi A, Catena F, et al. Diagnosis and management of small bowel obstruction in virgin abdomen: a WSES position paper. World J Emerg Surg 16 (2021): 36.
11. Zielinski MD, Haddad NN, Cullinane DC, et al. Multi-institutional, prospective, observational study comparing the Gastrografin challenge versus standard treatment in adhesive small bowel obstruction. J Trauma Acute Care Surg 83 (2017): 47-54.
12. Branco BC, Barmparas G, Schnüriger B, et al. Systematic review and meta-analysis of the diagnostic and therapeutic role of water-soluble contrast agent in adhesive small bowel obstruction. Br J Surg 97 (2010): 470-478.
13. Ceresoli M, Coccolini F, Catena F, et al. Water-soluble contrast agent in adhesive small bowel obstruction: a systematic review and meta-analysis of diagnostic and therapeutic value. Am J Surg 211 (2016): 1114-1125.
14. Biondo S, Parés D, Mora L, et al. Randomized clinical study of Gastrografin administration in patients with adhesive small bowel obstruction. Br J Surg 90 (2003): 542-546.
15. Khasawneh MA, Ugarte MLM, Srvantstian B, et al. Role of gastrografin challenge in early postoperative small bowel obstruction. J Gastrointest Surg 18 (2014): 363-368.
16. Scotté M, Mauvais F, Bubenheim M, et al. Use of water-soluble contrast medium (gastrografin) does not decrease the need for operative intervention nor the duration of hospital stay in uncomplicated acute adhesive small bowel obstruction? A multicenter, randomized, clinical trial (adhesive small bowel obstruction study) and systematic review. Surgery 161 (2017): 1315-1325.
17. Biondo S, Miquel J, Espin-Basany E, et al. A double-blinded randomized clinical study on the therapeutic effect of Gastrografin in prolonged postoperative ileus after elective colorectal surgery. World J Surg 40 (2016): 206-214.

18. Vather R, Josephson R, Jaung R, et al. Gastrografin in prolonged postoperative ileus: a double-blinded randomized controlled trial. Ann Surg 262 (2015): 23-30.

19. Di Saverio S. Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2013 update of the evidence-based guidelines from the world society of emergency surgery ASBO working group. World J Emerg Surg 8 (2013): 42.

20. Podda M, Khan M, Di Saverio S. Adhesive small bowel obstruction and the six w's: Who, how, why, when, what, andwhere to diagnose and operate? Scand J Surg 110 (2021): 159-169.

21. Quero G, Covino M, Laterza V, et al. Adhesive small bowel obstruction in elderly patients: a single-center analysis of treatment strategies and clinical outcomes. Scand J Gastroenterol 56 (2021): 784-790.

22. Fevang BT, Fevang J, Lie SA, et al. Long-term prognosis after operation for adhesive small bowel obstruction. Ann Surg 240 (2004): 193-201.

23. Long B, Robertson J, Koyfman A. Emergency Medicine Evaluation and Management of Small Bowel Obstruction: Evidence-Based Recommendations. J Emerg Med 56 (2019): 166-176.

24. Ten Broek RPG, et al. Bologn guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2017 update of the evidence-based guidelines from the world society of emergency surgery ASBO working group. World J Emerg Surg 13 (2018): 24.

25. Teixeira PG, Karamanos E, Talving P, et al. Early operation is associated with a survival benefit for patients with adhesive bowel obstruction. Ann Surg 258 (2013): 459-465.

26. Fevang BT, Fevang JM, Søreide O, et al. Delay in operative treatment among patients with small bowel obstruction. Scand J Surg 92 (2003): 131-137.

27. Demessence R, Lyoubi Y, Feuerstoss F, et al. Surgical management of adhesive small bowel obstruction: Is it still mandatory to wait? - An update. J Visc Surg 159 (2022): 309-319.

28. Assalia A, Scheim M, Kopelman D, et al. Therapeutic effect of oral Gastrograffin in adhesive, partial small -bowel obstruction: a prospective randomized trial. Surgery 115 (1994): 433-437.

29. Feigin E, Seror D, Szold A, et al.Water-soluble contrast material has no therapeutic effect on postoperative small-bowel obstruction: results of a prospective, randomized clinical trial. Am J Surg 171 (1996): 227-229.

30. Fevang BT, Jensen D, Fevang J, et al. Upper gastrointestinal contrast study in the management of small bowel obstruction--a prospective randomised study. Eur J Surg 166 (2000): 39-43.